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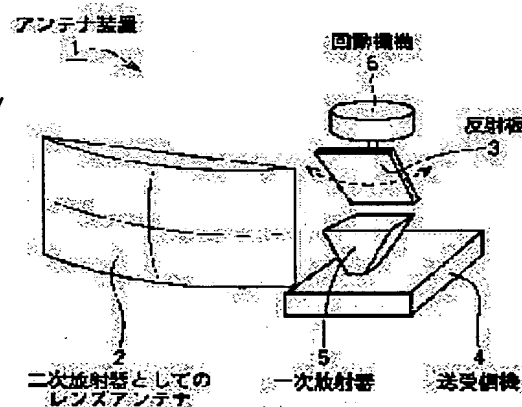
(72)Inventor : SATO KAZUHISA

## (54) ANTENNA DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an antenna device which can secure an approximately fixed beam pattern regardless of the beam scanning direction.

SOLUTION: A reflector 3 which reflects the radar beams, etc., radiated from a primary radiator 5 is rotatively placed between the radiator 5 and a secondary radiator 2. The reflector 3 is made of a member whose shape is variable and accordingly the shape of the reflector 3 is changed according to the rotating position (beam scanning angle) of the reflector 3. It is also effective to form a movable side part of the reflector 3 and to change the angle of this side part. Furthermore, the curvature of the reflector 3 is variable by changing the distances between the right and left ends and also between the upper and lower ends of the reflector 3 respectively.



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審査請求

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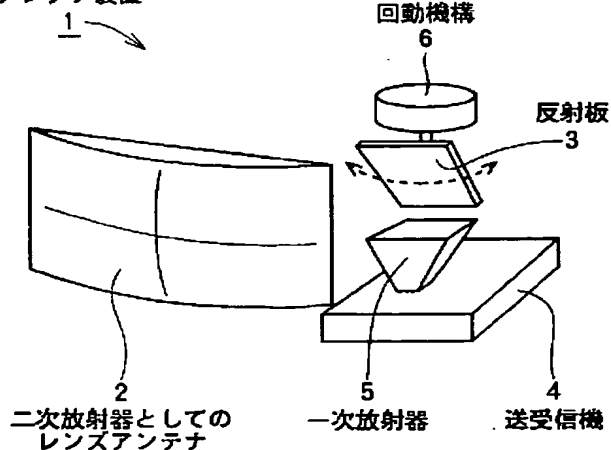
(54) 【発明の名称】 アンテナ装置

(57) 【要約】

【課題】 ビームの走査方向に拘らずほぼ一定のビームパターンとすることが可能なアンテナ装置を提供する。

【解決手段】 一次放射器 5 と二次放射器 2 との間に、一次放射器 5 から放射されたレーダビーム等を反射する反射板 3 を回動自在に設ける。反射板 3 は形状が変化可能な部材で構成する。反射板 3 の回動位置（ビームの走査角度）に応じて、反射板 3 の形状を変化させる。反射板 3 の側部を可動自在に形成して側部の角度を変更するようにしてもよい。反射板 3 の左右端の距離、上下端の距離を変化させることで反射板 3 の曲率を変化させるようにしてよい。

アンテナ装置



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## 【特許請求の範囲】

【請求項 1】 一次放射器から放射されたビームを可動可能な反射部で反射させてビームを走査させるアンテナ装置であって、

アンテナ装置は反射部の可動位置に応じて反射部の形状を変化させる変形手段を具備することを特徴とするアンテナ装置。

【請求項 2】 ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回動駆動する回動機構と、反射板により反射されたビームを収束させる二次放射器と、を備えたアンテナ装置であって、  
反射板は形状変化が可能な部材から成ることを特徴とするアンテナ装置。

【請求項 3】 ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回動駆動する回動機構と、を備えたアンテナ装置であって、  
反射板は形状変化が可能な部材から成り、  
アンテナ装置は反射板の回動に同期して反射板の形状を変化させる変形手段を具備することを特徴とするアンテナ装置。

【請求項 4】 ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回動駆動する回動機構と、反射板により反射されたビームを収束させる二次放射器と、を備えたアンテナ装置であって、  
反射板は形状変化が可能な部材から成り、  
アンテナ装置は反射板の回動に同期して反射板の形状を変化させる変形手段を具備し、  
二次放射器はレンズ又はパラボラアンテナから成ることを特徴とするアンテナ装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、ビーム走査を機械的に行う機械走査式のアンテナ装置に関する。

【0002】

【従来の技術】機械走査式のレーダ装置（アンテナ装置）は、レーダ装置自体を回転させるものやロータリージョイント等を用いて一次放射器以降を回転させるもの等が知られている。また、USP 5 5 7 9 0 2 1 には、機械走査式のアンテナ装置に平行放射器を組み合わせたものが記載されている。

【0003】

【発明が解決しようとする課題】しかしながら、一次放射器以降を回転させる構造のアンテナ装置は、リフレクタアンテナ、パラボラアンテナ、レンズアンテナ等の比較的重量を有するものを回転駆動する必要がある。このため、駆動用のモータが大型になると共に、長期間にわたって信頼性を確保することが困難となる。

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【0004】そこで、本発明者は、二次放射器であるレンズアンテナ 2 の焦点からオフセットさせた位置に反射板 1 3 を配置し、この反射板 1 3 を回転または揺動させることによって、高周波ビーム（レーダビーム）を走査させるようにした図 8 のアンテナ装置 1 1 を考案して、各種試験を行った。なお、図 8 において、符号 4 は例えばミリ波帯の高周波信号の送受信機、符号 5 は一次放射器、符号 6 は反射板 1 3 を回転または揺動させるためのモータ等を備えた回動機構である。反射板 1 3 の反射面は常に平面である。

【0005】一般的にレンズアンテナは、ビーム発信源をレンズアンテナの焦点に置いて使用することを前提として設計されている。このため、図 8 のアンテナ装置 1 1 では、ビーム走査角度によってビームパターンが異なることが判明した。

【0006】図 7 は、図 8 のアンテナ装置 1 1 において走査角度とビームパターンの鋭さ（シャープであるかブロードであるかの度合）との関係を示す説明図である。図 7 に示すように、反射面が平面の反射板 1 3 を揺動させた場合は、走査角度によってビームパターンの鋭さが変化している。レーダ装置において、ビームパターンの鋭さが変化すると最大検出距離が短くなったり、方位分解能が低下したりするので望ましくない。レンズアンテナ 2 のレンズ形状を、ビーム走査角度に拘らず一定のビームパターンが得られるような複雑な形状とすることも考えられるが、複雑なレンズ形状のレンズアンテナは量産的でない。

【0007】本発明はこのような課題を解決するためなされたもので、その目的は、走査角度に拘らずほぼ一定のビームパターンとすることを可能とするアンテナ装置を提供することにある。

【0008】

【課題を解決するための手段】本発明に係るアンテナ装置は、一次放射器から放射されたビームを可動可能な反射部で反射させてビームを走査させるアンテナ装置であって、アンテナ装置は反射部の可動位置に応じて反射部の形状を変化させる変形手段を具備することを特徴とする。

【0009】本発明に係るアンテナ装置は、ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回動駆動する回動機構と、反射板により反射されたビームを収束させる二次放射器と、を備えたアンテナ装置であって、反射板は形状変化が可能な部材から成ることを特徴とする。

【0010】本発明に係るアンテナ装置は、ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回動駆動する回動機構と、を備えたアンテナ装置であって、反射板は形状変化が可能な部材から成り、アンテナ

装置は反射板の回転に同期して反射板の形状を変化させる変形手段を具備することを特徴とする。

【0011】本発明に係るアンテナ装置は、ビームを送信または受信する一次放射器と、この一次放射器から放射されたビームを反射させる反射板と、この反射板を回転駆動する回転機構と、反射板により反射されたビームを収束させる二次放射器と、を備えたアンテナ装置であって、反射板は形状変化が可能な部材から成り、アンテナ装置は反射板の回転に同期して反射板の形状を変化させる変形手段を具備し、二次放射器はレンズ又はパラボラアンテナから成ることを特徴とする。

【0012】本発明に係るアンテナ装置では、一次放射器から放射されたビームを反射させる反射板（反射部）の形状をその回転位置（走査方向）に応じて変化させることで、反射板（反射部）で反射されたビームのビームパターンを制御することができ、走査方向に拘らずほぼ一定のビームパターンとすることが可能となる。

【0013】

【発明の実施の形態】以下、本発明の実施の形態を添付図面に基いて説明する。図1は、本発明に係るアンテナ装置の構造を示す斜視図である。

【0014】このアンテナ装置1は、二次放射器としてのレンズアンテナ2と、反射部である反射板3と、送受信機4と、一次放射器5と、回転機構6と、図示しない変形手段7とを備える。反射板3は、レンズアンテナ2の焦点からオフセットさせた位置に配置している。回転機構6は、モータと減速機構等を用いて構成している。一次放射器5は、送受信機4から供給される送信信号に基づいてビームを放射する。一次放射器5は、物標によって反射された信号を受信して、送受信機4へ供給する。なお、二次放射器として、パラボラアンテナや放射プレートを用いてもよい。

【0015】図2～図4は反射板の形状変化例を示す説明図である。反射板3は、反射面の形状が変化できる構造としている。図2は、反射板3の中央板部3aに対してその両側に開閉板部（可動板部）3b、3cを開閉可能に連結したものである。図3は、反射板3の両端の距離を変化させて反射板3の曲率を変化できるようにしたものである。図4は、反射板3の左右方向ならびに上下方向の距離を変化させて反射板3の曲率を変化できるようにしたものである。図3又は図4の反射板に対しては、反射板3を挟持する変形手段（不図示）により挟持力を加減することとしてもよい。

【0016】図5は、図1の反射板に対する変形手段の一構造例を示す説明図である。変形手段7は、図1に示した回転機構6の回転軸6aに固定されたアーム部材71と、アーム部材71の左右両端部にそれぞれ固定されたステッピングモータ72R、72Lと、このステッピングモータ72R、72Lによって駆動されるカム73R、73Lと、各開閉板部3b、3cをカム73R、7

3L側へ引っ張る戻しばね74R、74Lと、を備えている。

【0017】各開閉板部（可動板部）3b、3cは、中央板部3aに図示しない蝶番等を介して開閉可能に接続されている。なお、アーム部材71は、反射板3の中央板部3aに固定されていてもよい。図示しない変形制御手段は、反射板3の回転位置（またはビームの走査角度）に対応して予め設定した開閉板部の開閉量となるように各ステッピングモータ72R、72Lを駆動する。これにより、各カム73R、73Lによって各開閉板部3b、3cが開閉駆動されて、反射板3の形状が変化する。

【0018】反射板3を所定の角度範囲に亘って揺動させる構造では、各ステッピングモータ72R、73Lの駆動電力を可撓性のケーブルによって給電することが可能である。反射板3を360度回転させる場合は、回転機構6の回転軸6aにスリップリング等を設けて各ステッピングモータ72R、73Lへ駆動電力を供給するようにする。また、電池と無線受信機とを反射板3側に設け、ステッピングモータ駆動指令信号を無線通信によって供給して、ステッピングモータ72R、73Lの運転を制御するようにしてもよい。反射板3の中央板部3aの反射面と回転軸6aの軸方向とは平行に配置しない構成としてもよい。

【0019】なお、反射板3を変形させるための動力はモータの動力以外に、例えば反射板に液体を封入して流体の圧力を利用して反射板3の形状を3次的に変化させてもよく、流体の重みを用いて重力により反射板3の形状を変化させてもよい。また、反射板3をその中心軸の周りに自転させ、それ自身の遠心力で反射板3の形状を変化させてもよく、自転速度により形状の変化を制御してもよい。更に、形状記憶合金を用いて反射板3の形状を変化させてもよい。

【0020】図6は、本発明に係るアンテナ装置における走査角度とビームパターンの鋭さ（シャープであるかブロードであるかの度合）との関係を示す説明図である。走査角度に対応して反射板3の形状を変化させることで、図6に示すように、ビームパターンのシャープさ（鋭さ）をほぼ一定に保つことが可能となる。一方、反射面の形状が平面である反射板13の場合は、図7に示したように走査角度によってビームパターンが変化し、これに伴ってビームパターンのシャープさ（鋭さ）が変化する。なお、図6と図7において、横軸の走査角度は、ビーム走査範囲の中心の走査角度を0度としている。

【0021】本発明に係るアンテナ装置1を車載用のレーダ装置に適用する場合は、走査角度0度を車両の進行方向とし、路側物（路側帯の物標）を探索できる程度に走査範囲を設定するとともに、路側物を探索する走査角度においてはビームパターンがブロードになるように反

射板 3 の形状を変化させるようにしてもよい。路側物を探索する走査角度では、ビームパターンをブロードにすることで、近距離を探索範囲とすることができると共に探索範囲を広げることができるため、近距離を広角で探知することができる。反射板 3 の揺動範囲が一定であっても、揺動範囲の両端部分でビームパターンをブロードにすることで、反射板 3 の揺動範囲よりもさらに広い範囲を探索することができる。

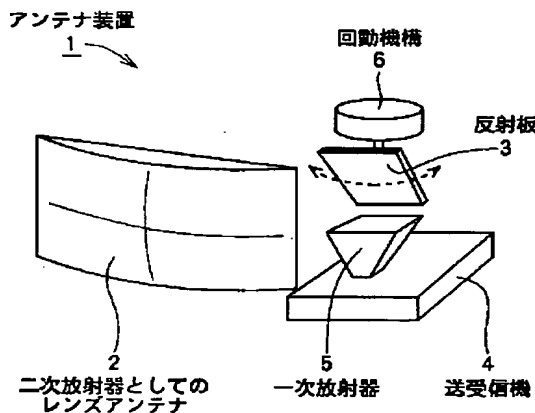
【0022】

【発明の効果】以上説明したように本発明のアンテナ装置によれば、走査角度（走査方向）に拘らずほぼ一定のビームパターンとすることが可能となる。また、特定の走査角度に対してビームパターンをシャープにしたりブロードにしたりすることが可能となる。

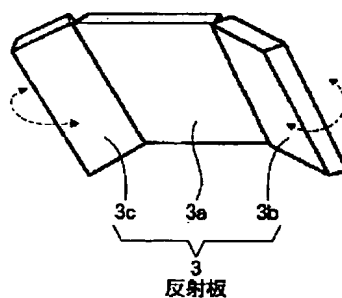
【図面の簡単な説明】

【図 1】 本発明のアンテナ装置の構造を示す簡易斜視図  
【図 2】 図 1 の反射板の形状変化例を示す簡易説明図

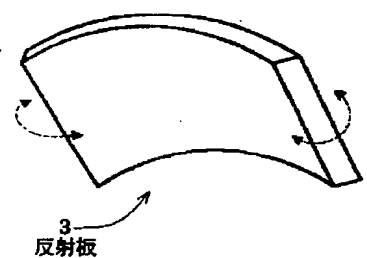
【図 1】



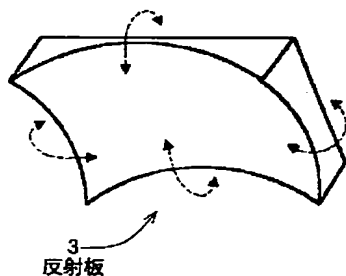
【図 2】



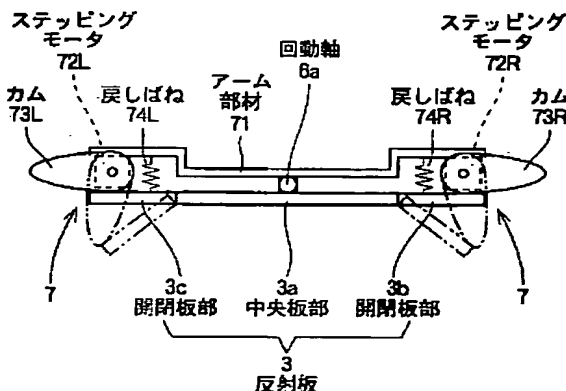
【図 3】



【図 4】



【図 5】



【図 3】 図 1 の反射板の他の形状変化例を示す簡易説明図

【図 4】 図 1 の反射板のさらに他の形状変化例を示す簡易説明図

【図 5】 変形手段の一構造例を示す簡易説明図

【図 6】 本発明のアンテナ装置における走査角度とビームパターンの鋭さ（シャープであるかブロードであるかの度合）との関係を示す簡易説明図

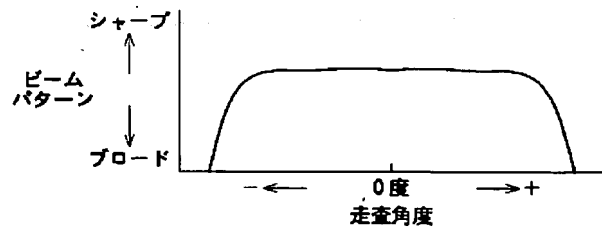
【図 7】 本発明と対比されるアンテナ装置における走査角度とビームパターンの鋭さ（シャープであるかブロードであるかの度合）との関係を示す簡易説明図

【図 8】 本発明と対比されるアンテナ装置の構造を示す簡易斜視図

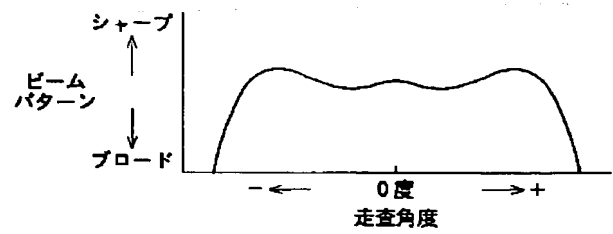
【符号の説明】

1, 11…アンテナ装置、2…二次放射器としてのレンズアンテナ、3, 13…反射部である反射板、4…送受信機、5…一次放射器、6…回動機構、7…変形手段。

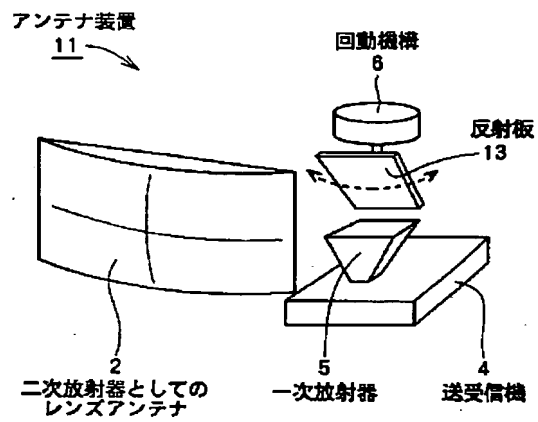
【図6】



【図7】



【図8】



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Bibliography

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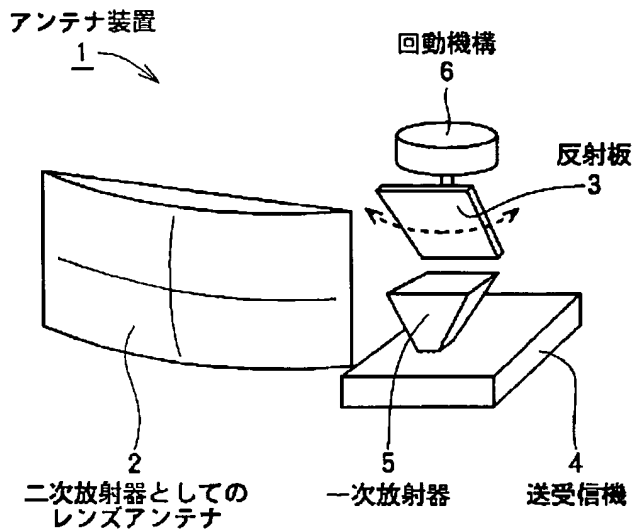
(57) [Abstract]

[Technical problem] the antenna equipment which can be considered as the beam pattern of about 1 law is offered irrespective of the scanning direction of a beam.

[Means for Solution] The reflecting plate 3 which reflects the radar beam emitted from the primary radiator 5 between the primary radiator 5 and the secondary radiator 2 is formed enabling free rotation. A reflecting plate 3 consists of members from which a configuration can change. The configuration of a reflecting plate 3 is changed according to the rotation location (scan include angle of a beam) of a reflecting plate 3. The flank of a reflecting plate 3 is formed free movable, and you may make it change the include angle of a flank. You may make it change the curvature of a reflecting plate 3 by changing the distance of the right-and-left edge of a reflecting plate 3, and the distance of a vertical edge.

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## CLAIMS

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[Claim(s)]

[Claim 1] It is antenna equipment which is antenna equipment which reflects the beam emitted from the primary radiator in the movable possible reflective section, and makes a beam scan, and is characterized by antenna equipment possessing a deformation means to change the configuration of the reflective section according to the movable location of the reflective section.

[Claim 2] It is antenna equipment characterized by to be antenna equipment equipped with the primary radiator which transmits or receives a beam, the reflecting plate made to reflect the beam emitted from this primary radiator, the rotation device which carries out the rotation drive of this reflecting plate, and the secondary radiator as which the

beam reflected by the reflecting plate is completed, and for a reflecting plate to consist of the member in which the formation of a form status change is possible.

[Claim 3] It is antenna equipment which it is antenna equipment equipped with the primary radiator which transmits or receives a beam, the reflecting plate made to reflect the beam emitted from this primary radiator, and the rotation device which carries out the rotation drive of this reflecting plate, and a reflecting plate consists of the member in which the formation of a form status change is possible, and is characterized by for antenna equipment to possess a deformation means change the configuration of a reflecting plate synchronizing with rotation of a reflecting plate.

[Claim 4] The primary radiator which transmits or receives a beam The reflecting plate made to reflect the beam emitted from this primary radiator The secondary radiator as which the rotation device which carries out the rotation drive of this reflecting plate, and the beam reflected by the reflecting plate are completed It is antenna equipment equipped with the above, and a reflecting plate consists of the member in which the formation of a form status change is possible, antenna equipment possesses a deformation means to change the configuration of a reflecting plate synchronizing with rotation of a reflecting plate, and it is characterized by a secondary radiator consisting of a lens or a parabolic antenna.

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#### DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the mechanical-

scanning-type antenna equipment which performs a beam scan mechanically.  
[0002]

[Description of the Prior Art] What rotates a primary radiator or subsequent ones using a thing, a rotary joint, etc. which a mechanical-scanning-type radar installation (antenna equipment) makes rotate the radar installation itself is known. Moreover, what combined the parallel radiator with mechanical-scanning-type antenna equipment is indicated by USP5579021.

[0003]

[Problem(s) to be Solved by the Invention] However, the antenna equipment of the structure of rotating a primary radiator or subsequent ones needs to carry out the rotation drive of the things which have weight comparatively, such as a reflector antenna, a parabolic antenna, and a lens antenna. For this reason, while the motor for a drive becomes large-sized, it becomes difficult to secure dependability over a long period of time.

[0004] Then, by arranging a reflecting plate 13 in the location made to offset from the focus of the lens antenna 2 which is a secondary radiator, and making it rotate or rock this reflecting plate 13, this invention person devised the antenna equipment 11 of drawing 8 it was made to make a high frequency beam (radar beam) scan, and performed various trials. In addition, it sets to drawing 8 and a sign 4 is the rotation device equipped with the motor for the transmitter-receiver of the RF signal of a millimeter wave band and a sign 5 to rock a primary radiator, and for a sign 6 make a reflecting plate 13 rotate or rock etc. The reflector of a reflecting plate 13 is always a flat surface.

[0005] Generally the lens antenna is designed considering using it, putting the source of beam dispatch on the focus of a lens antenna as a premise. For this reason, with the antenna equipment 11 of drawing 8, it became clear that a beam pattern changed with beam scan include angles.

[0006] Drawing 7 is the explanatory view showing the relation between a scan include angle and the sharpness (degree of whether it is sharp or to be broadcloth) of a beam pattern in the antenna equipment 11 of drawing 8. When a reflector makes the plane reflecting plate 13 rock as shown in drawing 7, the sharpness of a beam pattern is changing with scan include angles. In a radar installation, since the maximum detection distance will become short or lateral resolution will fall if the sharpness of a beam pattern changes, it is not desirable. Although making the lens configuration of a lens antenna 2 into a complicated configuration from which a beam pattern fixed irrespective of a beam

scan include angle is obtained is also considered, the lens antenna of a complicated lens configuration is not mass-production-like.

[0007] It was made in order that this invention might solve such a technical problem, and the purpose is in offering the antenna equipment which makes it possible to consider as an almost fixed beam pattern irrespective of a scan include angle.

[0008]

[Means for Solving the Problem] The antenna equipment concerning this invention is antenna equipment which reflects the beam emitted from the primary radiator in the movable possible reflective section, and makes a beam scan, and antenna equipment is characterized by providing a deformation means to change the configuration of the reflective section according to the movable location of the reflective section.

[0009] The antenna equipment concerning this invention is antenna equipment equipped with the primary radiator which transmits or receives a beam, the reflecting plate made to reflect the beam emitted from this primary radiator, the rotation device which carries out the rotation drive of this reflecting plate, and the secondary radiator as which the beam reflected by the reflecting plate is completed, and it is characterized by for a reflecting plate to consist of the member in which the formation of a form status change is possible.

[0010] The antenna equipment concerning this invention is antenna equipment equipped with the primary radiator which transmits or receives a beam, the reflecting plate which make reflect the beam emitted from this primary radiator, and the rotation device which carry out the rotation drive of this reflecting plate, a reflecting plate consists of the member in which the formation of a form status change is possible, and antenna equipment is characterized by to provide a deformation means change the configuration of a reflecting plate synchronizing with rotation of a reflecting plate.

[0011] The primary radiator with which the antenna equipment concerning this invention transmits or receives a beam, The reflecting plate made to reflect the beam emitted from this primary radiator, and the rotation device which carries out the rotation drive of this reflecting plate, It is antenna equipment equipped with the secondary radiator as which the beam reflected by the reflecting plate is completed. A reflecting plate consists of the member in which the formation of a form status change is possible, antenna equipment possesses a deformation means to change the configuration of a reflecting plate synchronizing with rotation of a reflecting plate, and it is characterized by a secondary radiator consisting of a lens or a parabolic antenna.

[0012] With the antenna equipment concerning this invention, the beam pattern of the beam reflected with the reflecting plate (reflective section) can be controlled by changing the configuration of a reflecting plate (reflective section) of reflecting the beam emitted from the primary radiator, according to the rotation location (scanning direction), and it becomes possible to consider as an almost fixed beam pattern irrespective of a scanning direction.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on an accompanying drawing. Drawing 1 is the perspective view showing the structure of the antenna equipment concerning this invention.

[0014] This antenna equipment 1 is equipped with the lens antenna 2 as a secondary radiator, the reflecting plate 3 which is the reflective section, a transmitter-receiver 4, a primary radiator 5, the rotation device 6, and the deformation means 7 that is not illustrated. The reflecting plate 3 is arranged in the location made to offset from the focus of a lens antenna 2. The rotation device 6 is constituted using a motor, a moderation device, etc. A primary radiator 5 emits a beam based on the sending signal supplied from a transmitter-receiver 4. A primary radiator 5 receives the signal reflected by the target, and supplies it to a transmitter-receiver 4. In addition, a parabolic antenna and a radiation plate may be used as a secondary radiator.

[0015] Drawing 2 - drawing 4 are the explanatory views showing the example of form status change-sized of a reflecting plate. The reflecting plate 3 is made into the structure where the configuration of a reflector can change. Drawing 2 connects closing motion Itabe (movable Itabe) 3b and 3c with the both sides possible [ closing motion ] to central Itabe 3a of a reflecting plate 3. Drawing 3 changes the distance of the both ends of a reflecting plate 3, and enables it to change the curvature of a reflecting plate 3. Drawing 4 changes the distance of the longitudinal direction of a reflecting plate 3, and the vertical direction, and enables it to change the curvature of a reflecting plate 3. It is good also as adjusting the pinching force with a deformation means (un-illustrating) to pinch a reflecting plate 3, to the reflecting plate of drawing 3 or drawing 4 .

[0016] Drawing 5 is the explanatory view showing the example of 1 structure of the deformation means against the reflecting plate of drawing 1 . The arm member 71 fixed to rotation shaft 6a of the rotation device 6 which showed the deformation means 7 to drawing 1 , The stepping motors 72R and 72L fixed to the right-and-left both ends of the

arm member 71, respectively, It comes to have the cams 73R and 73L driven with these stepping motors 72R and 72L, and the return springs 74R and 74L which pull each closing motion Itabe 3b and 3c to the cam 73R and 73L side.

[0017] Each closing motion Itabe (movable Itabe) 3b and 3c is connected possible [ closing motion ] through the hinge which is not illustrated to central plate section 3a. In addition, the arm member 71 may be fixed to central plate section 3a of a reflecting plate 3. The deformation control means which is not illustrated drives each stepping motors 72R and 72L so that it may become the amount of closing motion of closing motion Itabe who set up beforehand corresponding to the rotation location (or scan include angle of a beam) of a reflecting plate 3. Thereby, the closing motion drive of each closing motion Itabe 3b and 3c is carried out by each cams 73R and 73L, and the configuration of a reflecting plate 3 changes with them.

[0018] It is possible to supply electric power with a flexible cable in the drive power of each stepping motors 72R and 73L with the structure of covering the predetermined include-angle range and making it rocking a reflecting plate 3. When rotating a reflecting plate 3 360 degrees, the slip ring etc. is prepared in rotation shaft 6a of the rotation device 6, and drive power is supplied to each stepping motors 72R and 73L. Moreover, a cell and a radio set are formed in a reflecting plate 3 side, a stepping motor drive command signal is supplied by radio, and you may make it control operation of stepping motors 72R and 73L. The reflector of central plate section 3a of a reflecting plate 3 and the shaft orientations of rotation shaft 6a are good also as a configuration which is not arranged in parallel.

[0019] In addition, in addition to the power of a motor, the power for making a reflecting plate 3 transform may enclose a liquid with a reflecting plate, may change the configuration of a reflecting plate 3 to it in three dimension using the pressure of a fluid, and may change the configuration of a reflecting plate 3 to it with gravity using the weight of a fluid. Moreover, a reflecting plate 3 may be made to rotate around the medial axis, the configuration of a reflecting plate 3 may be changed with the centrifugal force of itself, and change of a configuration may be controlled by rotating velocity. Furthermore, the configuration of a reflecting plate 3 may be changed using a shape memory alloy.

[0020] Drawing 6 is the explanatory view showing the relation between the scan include angle in the antenna equipment concerning this invention, and the sharpness (degree of whether it is sharp or to be

broadcloth) of a beam pattern. By changing the configuration of a reflecting plate 3 corresponding to a scan include angle, as shown in drawing 6 , it becomes possible to keep Sharp (sharpness) of a beam pattern almost constant. On the other hand, when the configuration of a reflector is the reflecting plate 13 which is a flat surface, as shown in drawing 7 , a beam pattern changes with scan include angles, and Sharp (sharpness) of a beam pattern changes in connection with this. In addition, in drawing 6 and drawing 7 , the scan include angle of an axis of abscissa makes 0 times the scan include angle of the core of a beam scanning zone.

[0021] Zero scan include angle is made into the travelling direction of a car, and you may make it change the configuration of a reflecting plate 3, while setting a scanning zone as extent which can look for a road-side object (target of a side strip) when applying the antenna equipment 1 concerning this invention to the radar installation for mount so that a beam pattern may become broadcloth in the scan include angle which looks for a road-side object. At the scan include angle which looks for a road-side object, since the retrieval range can be extended by making a beam pattern into broadcloth while being able to make a short distance into the retrieval range, a short distance can be detected by the wide angle. Even if the rocking range of a reflecting plate 3 is fixed, making a beam pattern into broadcloth can search for the range still larger than the rocking range of a reflecting plate 3 by part for the both ends of the rocking range.

[0022]

[Effect of the Invention] As explained above, according to the antenna equipment of this invention, it becomes possible to consider as an almost fixed beam pattern irrespective of a scan include angle (scanning direction). Moreover, it becomes possible to make a beam pattern into Sharp or to make it into broadcloth to a specific scan include angle.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The simple perspective view showing the structure of the antenna equipment of this invention

[Drawing 2] The simple explanatory view showing the example of form status change-sized of the reflecting plate of drawing 1

[Drawing 3] The simple explanatory view showing other examples of form status change-sized of the reflecting plate of drawing 1

[Drawing 4] The simple explanatory view showing the example of form status change-sized of further others of the reflecting plate of drawing 1

[Drawing 5] The simple explanatory view showing the example of 1 structure of a deformation means

[Drawing 6] The simple explanatory view showing the relation between the scan include angle in the antenna equipment of this invention, and the sharpness (degree of whether it is sharp or to be broadcloth) of a beam pattern

[Drawing 7] The simple explanatory view showing the relation between the scan include angle in the antenna equipment contrasted with this invention, and the sharpness (degree of whether it is sharp or to be broadcloth) of a beam pattern

[Drawing 8] The simple perspective view showing the structure of the antenna equipment contrasted with this invention

[Description of Notations]

1 11 [ -- A transmitter-receiver, 5 / -- A primary radiator, 6 / -- A rotation device, 7 / -- Deformation means. ] -- Antenna equipment, 2 -- 3 The lens antenna as a secondary radiator, 13 -- The reflecting plate, 4 which are the reflective section

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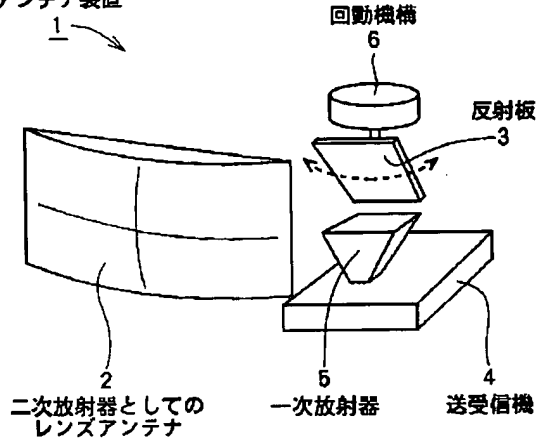
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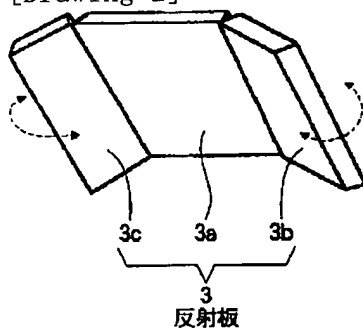
# DRAWINGS

[Drawing 1]

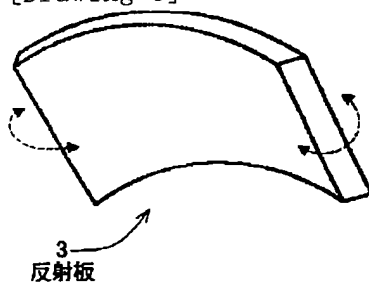
アンテナ装置



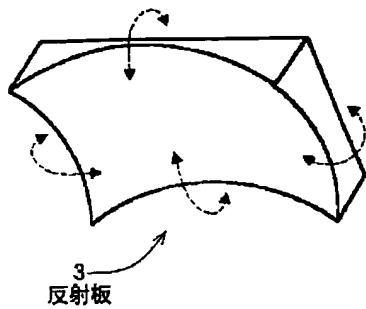
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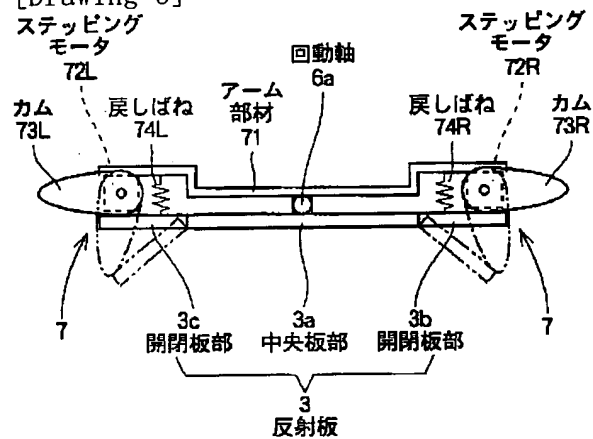
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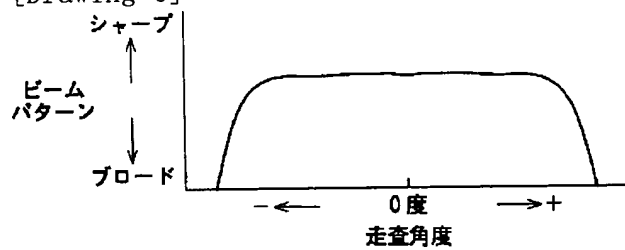
[Drawing 4]



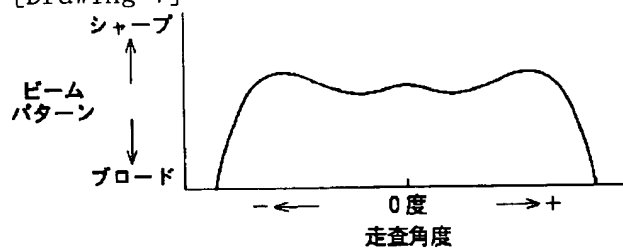
[Drawing 5]



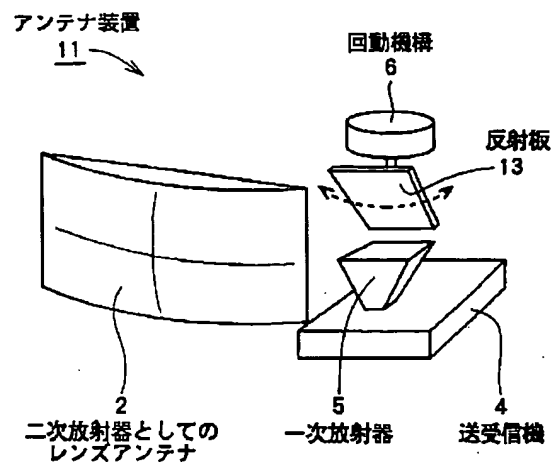
[Drawing 6]



[Drawing 7]



[Drawing 8]



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